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# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference OHM0244B	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP98/00364	International filing date (day/month/year) 29 January 1998 (29.01.1998)	Priority date (day/month/year) 29 January 1997 (29.01.1997)
International Patent Classification (IPC) or national classification and IPC H05H 1/46, H01L 21/31, C23F 4/00, C23C 16/50		
Applicant OHMI, Tadahiro		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of                      sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 01 July 1998 (01.07.1998)	Date of completion of this report 09 December 1998 (09.12.1998)
Name and mailing address of the IPEA/JP Japanese Patent Office, 4-3 Kasumigaseki 3-chome Chiyoda-ku, Tokyo 100-8915, Japan Facsimile No.	Authorized officer  Telephone No. (81-3) 3581 1101

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No

PCT/JP98/00364

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

- ☒ the international application as originally filed
- ☐ the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement under Article 19  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the drawings:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report!

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	2-8, 10-28, 34-35, 37-38, 41-46, 49, 51-73	YES
	Claims	1, 9, 29-33, 36, 39-40, 47, 49-50	NO
Inventive step (IS)	Claims	2-9, 10-24, 27-28, 35, 37, 42-43, 48, 52, 54-73	YES
	Claims	1, 9, 25-26, 29-34, 36, 39-41, 44-47, 49-51, 53	NO
Industrial applicability (IA)	Claims	1-73	YES
	Claims		NO

## 2. Citations and explanations

Claims 1, 9 and 29 through 33

Document 1 (JP, 8-111297, A (Tokyo Electron Ltd.), April 30, 1996 (30.04.96), [0014]-[0025]; [0052]; Fig. 1 and 2) discloses a plasma processing device having a treatment vessel that is completely cylindrical comprising side walls and a bottom made from a conductive material, such as aluminium, and provided with an insulator, such as quartz installed by means of a seal member, such as an O-ring in the ceiling of the treatment vessel, a system supplying treatment gas to the inside of the vessel in the side wall of the treatment vessel, an exhaust system in the bottom of the vessel, a planar antenna member in the upper part of the insulator and a mount for transporting the object to be processed into the vessel that is connected to a high-frequency power source.

Since the side walls and bottom of the treatment vessel are made of aluminium, the conductivity is  $3.7 \times 10^7 \Omega^{-1} \text{m}^{-1}$  or more and the thickness is greater than  $(2/\mu_0 \sigma \omega)^{1/2}$  that is disclosed in Claim 1. Moreover, an insulator comprising quartz has a dielectric loss angle of  $10^{-3}$  or less. Document 1 also discloses that the above-mentioned plasma processing device can be applied to a plasma etching device, a plasma ashing device or a plasma CVD device.

Therefore, Claims 1, 9 and 29 through 33 lack novelty

in the light of Document 1.

Claim 1

Document 2 (JP, 1-298183, A (NEC Corp.), December 1, 1989 (01.12.89), claims; page 2, upper left column, lines 9 to 15; Fig. 1) discloses making the area of the surface which comes into contact with the plasma within a vacuum vessel of a plasma dry etching device from a copper material. It would be obvious to a person skilled in the art to replace the aluminium used as a material for the vacuum chamber disclosed in Document 1 with the copper disclosed in Document 2.

Claim 25

Document 3 (JP, 5-62913, A (Canon Inc.), March 12, 1993 (12.03.93), [0033]; Fig. 4) discloses a plasma CVD device having an anode combined with a heater plate. It would be obvious to a person skilled in the art to replace the mount disclosed in Document 1 with the heater plate disclosed in Document 2 for heating the substrate.

Claim 26

Document 4 (JP, 7-307326, A (Sony Corp.), November 21, 1995 (21.11.95), [0019]; [0033]-[0035]; Fig. 1) discloses a plasma etching device having a xenon lamp as a heating means for the surface of the substrate to be etched. It would be obvious to a person skilled in the art to apply the xenon lamp disclosed in Document 4 to the plasma etching device disclosed in Document 1 for heating the substrate.

Claim 34

Document 5 (JP, 63-50477, A (Fujitsu Ltd.), March 3, 1988 (03.03.88), claims; Fig. 1) discloses a plasma CVD device with RF power density of  $0.5\text{W}/\text{cm}^2$ - $2.0\text{W}/\text{cm}^2$ .

Although the power density of the plasma CVD device disclosed in Document 1 is not specifically disclosed, the power density of a plasma CVD device does not feature strongly in the structure and it would be obvious to a person skilled in the art to give the plasma CVD device disclosed in Document 1 the power density disclosed in Document 5.

Claims 36, 47 and 50

Document 6 (JP, 6-224183, A (K.K. INR Kenkyusho), August 12, 1994 (12.08.94), [0011]; Fig. 2) discloses a sputter etching processing device wherein a sample to be processed is placed on a target electrode, a magnetic coil is positioned on the outside of the outer wall and exhaust gas emitted from between the magnetic coil. Therefore, the invention disclosed in Claims 36, 47 and 50 lacks novelty.

Claim 38

Document 7 (JP, 9-27397, A (Oki Electric Industry Co., Ltd.), January 28, 1997 (28.01.97), [0007]-[0008]; Fig. 2) discloses a plasma processing device wherein a magnetic field is formed parallel in respect to the electrode. Document 6 does not disclose a sputter etching processing device wherein a magnetic field is formed parallel in respect to the electrode, but it would be obvious to a person skilled in the art to form the magnetic field in the manner disclosed in Document 7.

Claims 39 and 40

Document 8 (JP, 61-265820, A (Anelva Corp.), November 25, 1986 (25.11.86), claims; page 3, lower left column, lines 4 to 11; Fig. 2 (b)) discloses the feature of dividing the electrode on which the object to be processed is mounted into two and positioning an electrode centrally.

Document 9 (JP, 3-55832, A (Toshiba Corp.), March 11, 1991 (11.03.91), claims; Fig. 1) discloses the feature of dividing the electrode on which the object to be processed is mounted into two and providing a high-frequency power source to each electrode.

Therefore, the invention disclosed in Claims 39 and 40 lacks novelty in light of Documents 8 and 9, respectively.

#### Claim 41

Document 7 discloses a plasma processing device wherein the magnetic field is formed parallel to the electrode. It would be obvious to a person skilled in the art to apply the magnetic field generation feature disclosed in Document 7 to the plasma processing device disclosed in Document 8 or 9 in order to ensure a uniform plasma density.

#### Claims 44 through 46

Document 10 (JP, 8-45197, A (Hitachi, Ltd.), February 16, 1996 (16.02.96), [Claim 66]; [0047]-[0048]; [0053]; [0066]; Fig. 1) discloses a plasma processing device having two vacuum pumps in addition to a plurality of vacuum pumps installed in axial symmetry to the perpendicular axis of the surface of the object to be processed. It would be obvious to a person skilled in the art to apply this type of exhaust system to the plasma processing device disclosed in Document 6 in order to improve exhaust capacity.

#### Claims 47, 49 and 50

Document 10 discloses a plasma processing device having a plurality of vacuum pumps installed in axial symmetry to the perpendicular axis of the surface of the object to be processed. Therefore, Claims 47, 49 and 50 lack novelty.

Claims 51 and 53

It would be obvious to a person skilled in the art to apply the feature of a plasma processing device having a plurality of vacuum pumps installed in axial symmetry to the perpendicular axis of the surface of the object to be processed that is disclosed in Document 10 to the plasma processing device disclosed in Document 1 in order to improve the exhaust capacity.



## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

- Claims 44 and 46 are multiple dependent claims which refer back to multiple dependent claims (see Rule 6.4 (a)).

## VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. The Claims are unclear in the following places:
  - Claim 16: "whether shielded by the shield plate. Or"  
(Incomplete sentence.)
  - Claim 18: "antenna guide" (The feature of an antenna guide does not appear in either Claim 18 or those claims which refer back to Claim 18).
  - Claim 70: "antenna guide" (The feature of an antenna guide does not appear in either Claim 70 or those claims which refer back to Claim 70).
2. The specification is unclear in the following places:
  - "Figure 37" of the specification, page 7, line 15 should read "Figure 39".
  - The meaning of "leak amount proposal ("teigen" in Japanese)" of the specification, page 14, line 8 is unclear. (Should perhaps be "reduction" ("Teigen" in Japanese).)
  - The meaning of "the feature of 2 cases ("nibaai" in Japanese)" is unclear. (Should perhaps be "2 times" ("nibai" in Japanese).)
3. In the following places the numbering between the
  - It is unclear which figure represents the structure no. 6000 disclosed in the specification, page 66, line 18 to page 67, line 27.
  - The specification, page 66, line 29 states "Figure 85 shows a detailed description of the process", but Figure 85 shows a cluster tool.
  - The unit for coverage in the specification, page 70, lines 26 to 27, page 71, line 10 and line 23 is "mm<sup>2</sup>", but this should probably read "m<sup>2</sup>".

## VIII. Certain observations on the international application

specification and figures do not match:

- The feature represented by "418" in the specification, page 17, line 28 is not shown in Figure 44.
  - The feature represented by "405" in the specification, page 18, line 25 is not shown in Figure 43.
  - The feature represented by "45005" in the specification, page 19, line 1 is not shown in Figure 45.
  - The feature represented by "5500" in the specification, page 22, lines 21 to 25 is not shown in Figure 56.
  - The feature represented by "800" in the specification, from page 46, line 26 to page 47, line 19 is not shown in Figure 56.
  - The feature represented by "4000" in the specification, from page 52, line 27 to page 53, line 19 is not shown in Figure 60.
  - The feature represented by "5000" in the specification, from page 55, line 12 to page 56, line 4 is not shown in Figure 64.
4. The figures are unclear in the following places:
- Figure 12 does not show "region B". (See specification, page 6, explanation of Figure 13 and last line of page 28.)
  - In Figure 43 (a), "4303" is written in two places.
  - There is no numbering on the figures believed to be Figures 90 through 92.